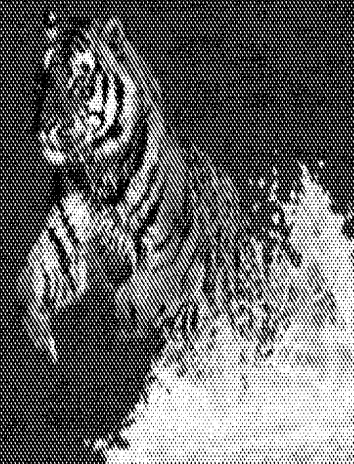
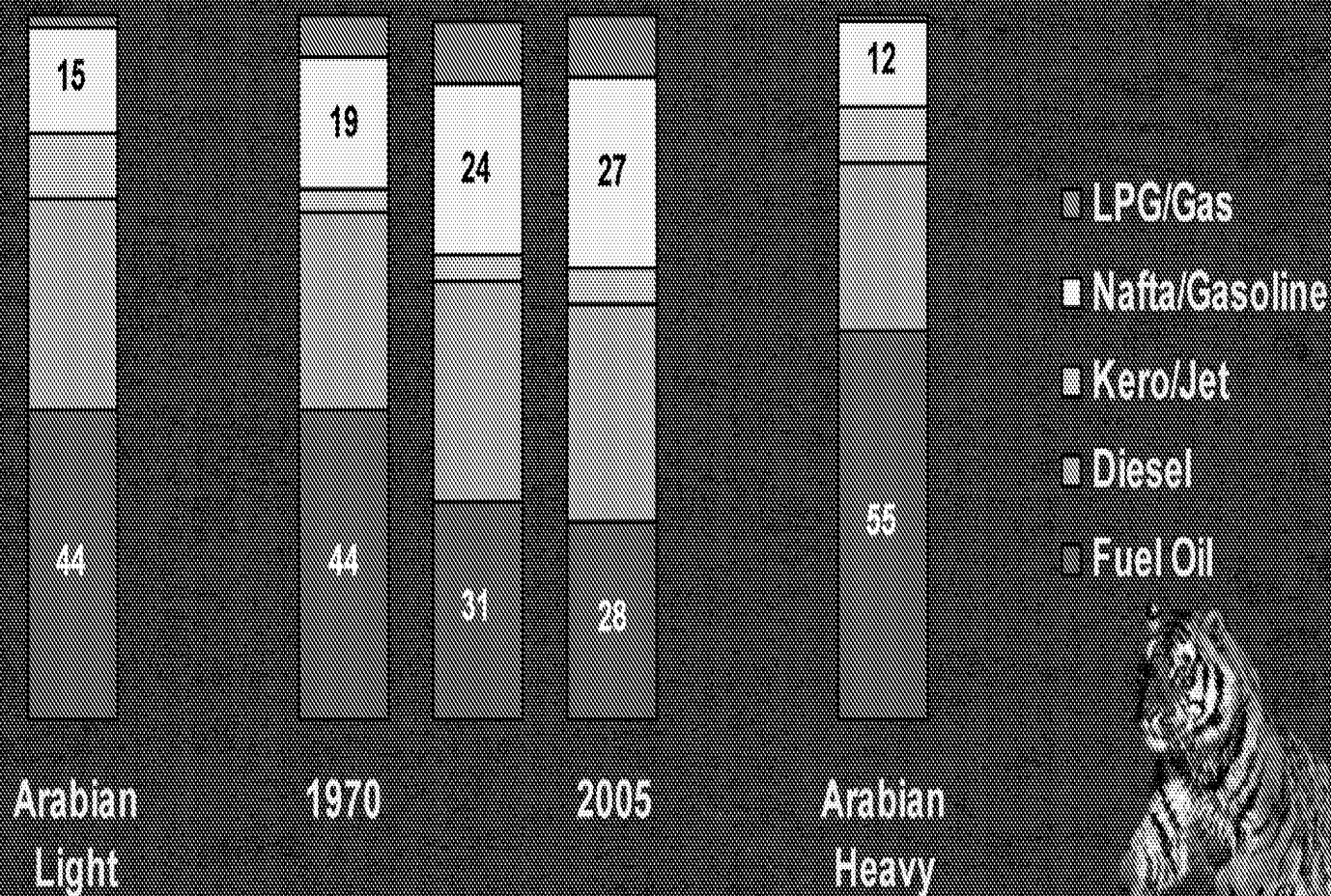
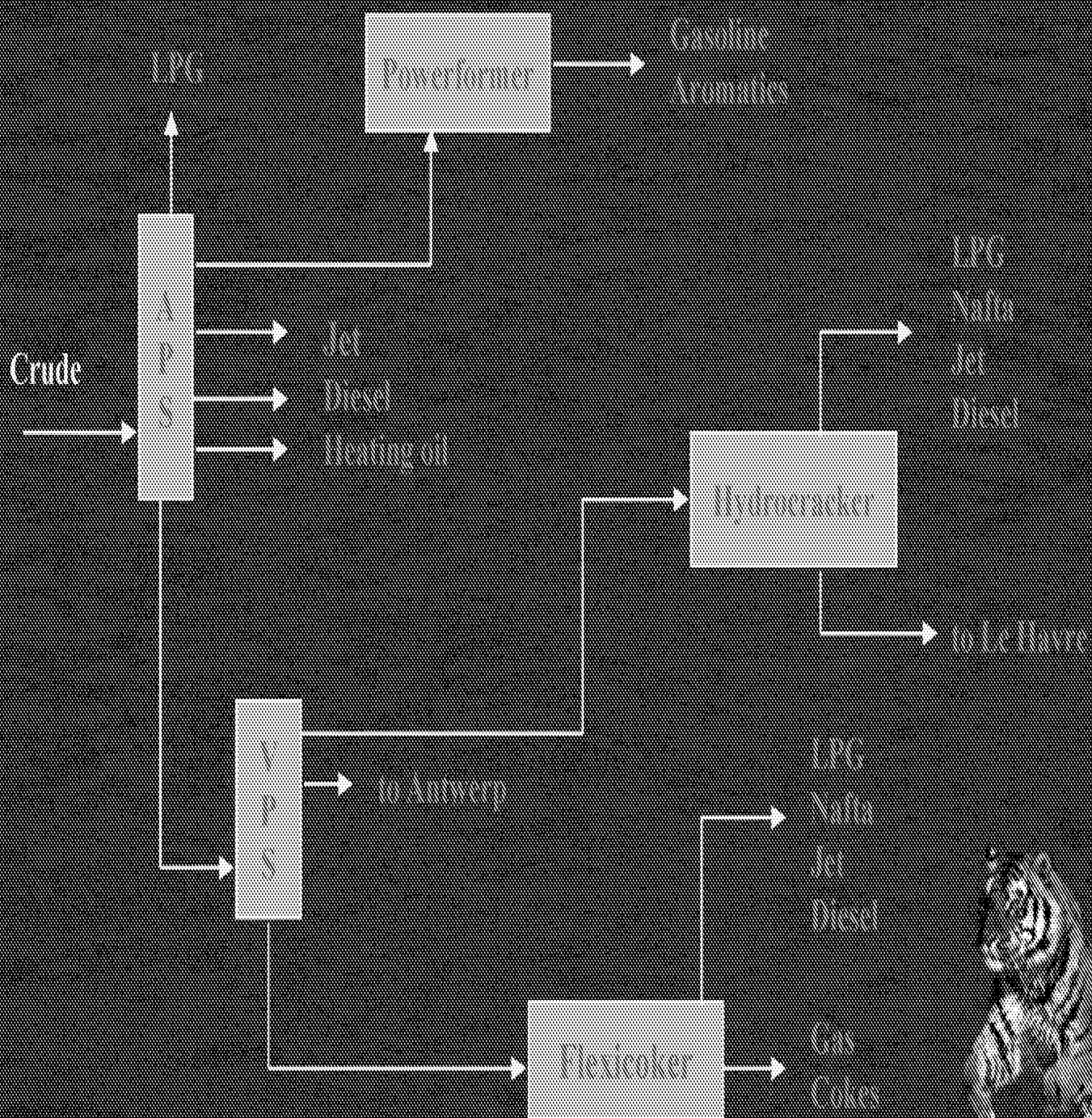


Market demand and crude oil supply



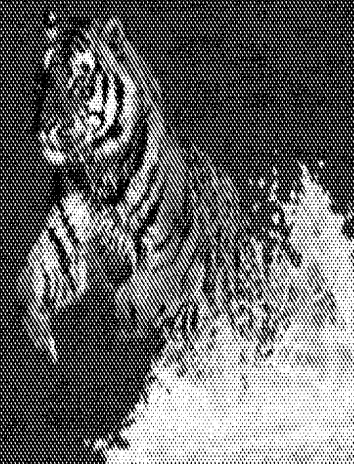
Esso Rotterdam Refinery



Vacuum Residue Conversion Processes

Considerations:

- Market demands for light products
- Environmental legislation for cleaner products
- Stricter regulations on refinery emissions
- Vacuum residue contains a lot of carbon and little hydrogen but also 3-5% sulphur, nitrogen and metals like vanadium and nickel



Vacuum Residue Conversion Processes

Two routes for vacuum residue conversion :

- ❑ Hydrogen addition processes : Residfining, Hycon
 - ♦ high temperature, high hydrogen pressure
 - ♦ rapid catalyst deactivation requires large reactors or moving catalyst
 - ♦ sensitive for metal contaminants
 - ♦ products do not need any further treating
- ❑ Carbon rejection by thermal cracking : Delayed Coking, FLUID and FLEXICOKING
 - ♦ high temperature, low pressure, no hydrogen
 - ♦ no catalyst, abundant coke
 - ♦ insensitive to contaminants
 - ♦ low refinery SO₂ emissions
 - ♦ products need after treatment in conventional hydrofiners



Flexicokers

All build 1980 - 1990, investment > 1 billion \$\$

Rotterdam	NL	ExxonMobil
Baytown	USA-Tx	ExxonMobil
Martinez	USA-Ca	Shell
TOA	Japan	State-owned
Amuay	Venezuela	State-owned

Why only 5 Flexicokers in the world ?

- ♦ Initial investment
- ♦ Mechanical cost (mainly in Turnaround)
- ♦ Runlength



SIMPLIFIED FLEXICOKER PROCESS

